

Chapter 1. General Introduction

INTRODUCTION

The South Bay Ocean Outfall (SBOO) discharges treated effluent to the Pacific Ocean that originates from two separate sources, including the International Wastewater Treatment Plant (IWTP) operated by the City of San Diego's South Bay Water Reclamation Plant (SBWRP) and the International Boundary and Water Commission (IBWC). Wastewater discharge from the IWTP began on January 13, 1999 and is performed under the terms and conditions set forth in Order No. 96-50, Cease and Desist Order No. 96-52 for NPDES Permit No. CA0108928. Discharge from the SBWRP began on May 6, 2002 and is presently performed according to the provisions set forth in Order No. R9-2006-0067 for NPDES Permit No. CA0109045. The Monitoring and Reporting Programs (MRPs) included in the above permits and orders define the requirements for monitoring receiving waters in the region, including sampling design, compliance criteria, types of laboratory analyses, and data analysis and reporting guidelines.

All receiving waters monitoring for the South Bay region with respect to the above referenced permits has been performed by the City of San Diego since discharge began in 1999. The City also conducted 3½ years of pre-discharge monitoring in order to characterize background environmental conditions for the SBOO region (City of San Diego 2000a). The results of this baseline study provide background information against which post-discharge data and conditions may be compared. In addition, the City has conducted annual region-wide surveys off the coast of San Diego since 1994 either as part of regular South Bay monitoring requirements (e.g., City of San Diego 1998, 1999, 2000b, 2001, 2002, 2003, 2006, 2007) or as part of larger, multi-agency surveys of the entire Southern California Bight (e.g., Bergen et al. 1998, 2001, Noblet et al. 2002, Ranasinghe et al. 2003, 2007, Schiff et al. 2006). Such large-scale surveys are useful in characterizing the ecological health of diverse coastal areas and may help to identify and

distinguish reference sites from those impacted by wastewater or stormwater discharges, urban runoff, or other sources of contamination.

Finally, the City of San Diego and the IBWC also contract with Ocean Imaging Corporation (Solana Beach, CA) to conduct a remote sensing program for the San Diego/Tijuana region as part of the ocean monitoring programs for the Point Loma and South Bay areas. Imagery from satellite data and aerial sensors produce a synoptic look at surface water clarity that is not possible using shipboard sampling alone. However, a major limitation of aerial and satellite images is that they only provide information about surface or near-surface waters (~0–15 m) without providing direct information regarding the movement, color, or clarity of water in deeper layers. In spite of these limitations, one objective of this ongoing project is to ascertain relationships between the various types of imagery and data collected in the field. With public health issues being a paramount concern of ocean monitoring programs, any information that helps to provide a clearer and more complete picture of water conditions is beneficial to the general public as well as to program managers and researchers. Having access to a large-scale overview of surface waters within a few hours of image collection also has the potential to bring the monitoring program closer to real-time diagnosis of possible contamination conditions and add predictability to the impact that natural events such as storms and heavy rains may have on shoreline water quality. Results from the San Diego/Tijuana remote sensing program for calendar year 2007 are summarized in Svejksky (2008).

This report presents the results of all receiving waters monitoring conducted as part of the South Bay monitoring program in 2007. Included are sampling at both regular fixed stations surrounding the SBOO and at a set of randomly selected sites monitored for the annual benthic survey of the entire San Diego coastal region. The results of

the remote sensing surveys conducted during the year are also considered and integrated into interpretations of oceanographic and water quality data (e.g., bacteria levels, total suspended solids, oil and grease). Comparisons are also made to conditions present during previous years in order to evaluate any changes that may have occurred related to the outfall or other anthropogenic or natural events. The major components of the monitoring program are covered in the following chapters: Oceanographic Conditions, Microbiology, Sediment Characteristics, Macrobenthic Communities, Demersal Fishes and Megabenthic Invertebrates, Bioaccumulation of Contaminants in Fish Tissues, Regional Sediment Conditions, and Regional Macrobenthic Communities. Some general background information and procedures for the regular fixed-grid and regional monitoring programs and associated sampling designs are given below and in subsequent chapters and appendices.

REGULAR FIXED-GRID MONITORING

The South Bay Ocean Outfall is located just north of the border between the United States and Mexico. The outfall terminates approximately 5.6 km offshore at a depth of about 27 m. Unlike other southern California outfalls that are located on the surface of the seabed, the pipeline first begins as a tunnel on land and then continues under the seabed to a distance about 4.3 km offshore. From there it connects to a vertical riser assembly that conveys effluent to a pipeline buried just beneath the surface of the seabed. This subsurface pipeline then splits into a Y-shaped multiport diffuser system, with the two diffuser legs extending an additional 0.6 km to the north and south. The outfall was originally designed to discharge effluent via a total of 165 diffuser risers, which included one riser located at the center of the “Y” and 82 other risers spaced along each diffuser leg. However, low flows have required closure of all ports along the northern diffuser leg and many along the southern diffuser since discharge began in order to maintain sufficient back

pressure within the drop shaft so that the outfall can operate in accordance with the theoretical model. Consequently, wastewater discharge has been generally limited to the distal end of the southern diffuser leg, with the exception of a few intermediate points at or near the center of the diffusers.

The regular SBOO sampling area extends from the tip of Point Loma southward to Playa Blanca, Mexico, and from the shoreline seaward to a depth of about 61 m. The offshore monitoring stations are arranged in a fixed grid that spans the terminus of the outfall, with each site being monitored in accordance with NPDES permit requirements. Sampling at these fixed stations includes monthly seawater measurements of physical, chemical, and bacteriological parameters in order to document water quality conditions in the area. Benthic sediment samples are collected semiannually to monitor macrofaunal communities and sediment conditions. Trawl surveys are performed quarterly to monitor communities of demersal fish and large, bottom-dwelling invertebrates. Additionally, analyses of fish tissues are performed semiannually to monitor levels of chemical constituents that may have ecological or human health implications.

RANDOM SAMPLE REGIONAL SURVEYS

In addition to the regular fixed grid monitoring around the SBOO, the City typically conducts a summer benthic survey of sites distributed throughout the entire San Diego region as part of the monitoring requirements for the South Bay outfall. These annual surveys are based on an array of stations that are randomly selected by the United States Environmental Protection Agency (USEPA) using the probability-based EMAP design. Surveys conducted in 1994, 1998, and 2003 involved other major southern California dischargers, were broader in scope, and included sampling sites representing the entire Southern California Bight (SCB), from Cabo Colonet, Mexico to Point Conception, USA. These regional surveys were the 1994 Southern California Bight Pilot Project (SCBPP), and the

Southern California Bight 1998 and 2003 Regional Monitoring Programs (Bight'98 and Bight'03, respectively). Results of these three bight-wide surveys are available in Bergen et al. (1998, 2001), Noblet et al. (2002), Ranasinghe et al. (2003, 2007), and Schiff et al. (2006). A separate regional survey was not conducted in 2004 in order to conduct a special "sediment mapping" study pursuant to an agreement with the San Diego Regional Water Quality Control Board and USEPA (see Stebbins et al. 2004, City of San Diego 2005).

The 2007 summer survey of randomly selected sites off San Diego covered an area from Del Mar south to the Mexican border and extending offshore from depths of 12 m to about 197 m. This survey revisited the same randomly selected sites targeted in 1997 (see City of San Diego 1999). Although 40 sites were targeted each year, 39 were successfully sampled in 2007 compared to 37 originally in 1997. Unsuccessful sampling was typically due to the presence of rocky substrates or reefs that made it impossible to collect benthic grab samples.

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